REMARKS

This application has been carefully reviewed in light of the Office Action dated March 28, 2003 (Paper No. 6). Claims 1 to 9 and 11 to 20 are in the application, of which Claims 1, 12, 13 and 15 are the independent claims. Reconsideration and further examination are respectfully requested.

A new title has been selected.

Claims 1 to 20 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Reconsideration and withdrawal of the § 112 rejection are respectfully requested, in view of the amendments to these claims which further clarify the operation and structure of the semiconductor ring lasers.

Claims 1 to 3, 5 to 8 and 10 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 3,862,803 (Yntema); and Claims 12 to 20 were rejected under 35 U.S.C. § 103(a) over Japan 59-41883 (Hideo) in view of Japan 4-174317 (Masahiro). Reconsideration and withdrawal of these rejections are respectfully requested.

The invention generally concerns a ring laser gyro which includes a plurality of optically independent semiconductor ring lasers including at least first and second semiconductor ring lasers, where each of the plurality of semiconductor ring lasers has counterpropagating laser beams which generate a beat frequency in response to angular velocity. A change in the beat frequency with respect to a change in angular velocity of a first semiconductor ring laser is opposite that of a second semiconductor ring laser, and the angular velocity of rotation of the ring laser gyro is detected using a signal representing a difference between a first beat frequency generated by the first semiconductor ring laser, and a second beat frequency generated by the second semiconductor ring laser.

Referring to specific claim language, independent Claim 1 concerns a ring laser gyro including a plurality of semiconductor ring lasers, including at least first and second semiconductor ring lasers, each of the first and second semiconductor ring lasers being optically independent of each other. Each of the first and second semiconductor ring lasers have counterpropagating laser beams which generate a beat frequency in response to angular velocity. A change in beat frequency with respect to a change in angular velocity of the first semiconductor ring laser is opposite to that of the second semiconductor ring laser. The angular velocity of rotation of the ring laser gyro is detected using a signal representing a difference between a first beat frequency generated by the first semiconductor ring laser and a second beat frequency generated by the second semiconductor ring laser.

Independent Claim 12 concerns a method of driving a ring laser gyro, including operating a plurality of semiconductor ring lasers, including at least first and second semiconductor ring lasers, at a constant current. Each of the first and second semiconductor ring lasers have counterpropagating laser beams which generate a beat frequency in response to angular velocity. The plurality of semiconductor ring lasers are optically independent from each other, and a change in beat frequency with respect to a change in angular velocity of the first semiconductor ring laser is opposite to that of the second semiconductor ring laser. The angular velocity of rotation of the ring laser gyro is detected by a signal representing a difference between a first beat frequency generated by the first semiconductor ring laser, and a second beat frequency generated by a second semiconductor ring laser. The method of driving a ring laser gyro also includes the step of detecting a voltage change at electric terminals which are connected to each of the plurality of semiconductor ring lasers.

Independent Claim 13 concerns a method of driving a ring laser gyro, including operating a plurality of semiconductor ring lasers, including at least first and second semiconductor ring lasers, at a constant voltage. Each of the first and second semiconductor ring lasers have counterpropagating laser beams which generate a beat frequency in response to angular velocity. The plurality of semiconductor ring lasers are optically independent from each other, and a change in beat frequency with respect to a change in angular velocity of the first semiconductor ring laser is opposite to that of the second semiconductor ring laser. The angular velocity of rotation of the ring laser gyro is detected by a signal representing a difference between a first beat frequency generated by the first semiconductor ring laser, and a second beat frequency generated by a second semiconductor ring laser. The method of driving a ring laser gyro also includes the step of detecting a current change at electric terminals which are connected to each of the plurality of semiconductor ring lasers.

Independent Claim 15 concerns a method of processing a signal from a ring laser gyro, including operating a plurality of semiconductor ring lasers, including at least first and second semiconductor ring lasers. Each of the first and second semiconductor ring lasers have counterpropagating laser beams which generate a beat frequency in response to angular velocity. The plurality of semiconductor ring lasers are optically independent from each other, and a change in beat frequency with respect to a change in angular velocity of the first semiconductor ring laser is opposite to that of the second semiconductor ring laser. The angular velocity of rotation of the ring laser gyro is detected by a signal representing a difference between a first beat frequency generated by the first semiconductor ring laser, and a second beat frequency generated by a second semiconductor ring laser. The method of processing a signal from a ring laser gyro

includes the step of detecting angular velocity and rotational direction of the ring laser gyro on the basis of an impedance change in the plurality of semiconductor ring lasers.

The applied art is not seen to disclose or to suggest the features of the invention. Specifically, the applied art is not seen to disclose or reasonably to suggest at least the feature of a ring laser gyro which has a plurality of semiconductor ring lasers, where the plurality of ring lasers are optically independent of each other and each of the plurality of semiconductor ring lasers has counterpropagating laser beams which generate a beat frequency in response to angular velocity, and where a change in beat frequency with respect to a change in angular velocity of a first semiconductor ring laser is opposite to that of a second semiconductor ring laser.

Yntema discloses a laser gyro in which polarization anisotropy and directional anisotropy are applied in an optical path, so as to provide for two laser gyros which operate in the same cavity. See Yntema, Abstract; Figure 1; and col. 4, lines 21 to 59. Specifically, Yntema uses single laser gain medium 24, in conjunction with Faraday cell 25 and quarts crystal 28 to cause a traveling wave of light energy to pass through a single optical system at different speeds, depending on the direction. As such, Yntema is not seen to disclose or to suggest the features of the invention of the subject application, in which the ring laser gyro has a plurality of semiconductor ring lasers, where the plurality of ring lasers are optically independent of each other and each of the plurality of semiconductor ring lasers has counterpropagating laser beams which generate a beat frequency in response to angular velocity, and where a change in beat frequency with respect to a change in angular velocity of a first semiconductor ring laser is opposite to that of a second semiconductor ring laser.

As Applicants understand Hideo and Masahiro, Hideo is seen to disclose an apparatus which prevents the phenomenon of "locking," in laser gyros with counter-rotating lasers. Specifically, in Hideo, each of ring lasers 11 and 12 are seen to propagate laser light in only one direction, either clockwise or counterclockwise. Furthermore, output waveguide 13 couples the optical system of ring lasers 11 and 12, in order to output laser lights to beat detector 15. As such, Hideo is not seen to disclose or to suggest the features of the invention of the subject application, in which the ring laser gyro has a plurality of semiconductor ring lasers, where the plurality of ring lasers are optically independent of each other, and each of the plurality of semiconductor ring lasers has counterpropagating laser beams which generate a beat frequency in response to angular velocity, and where a change in beat frequency with respect to a change in angular velocity of a first semiconductor ring laser is opposite to that of a second semiconductor ring laser.

Masahiro has been reviewed, but is not seen to add anything to the above-mentioned deficiency of Hideo. Specifically, since Masahiro only discloses a single ring laser, it is impossible for Masahiro to shed any light on operation of plural semiconductor ring lasers, much less the mutual relationship between them.

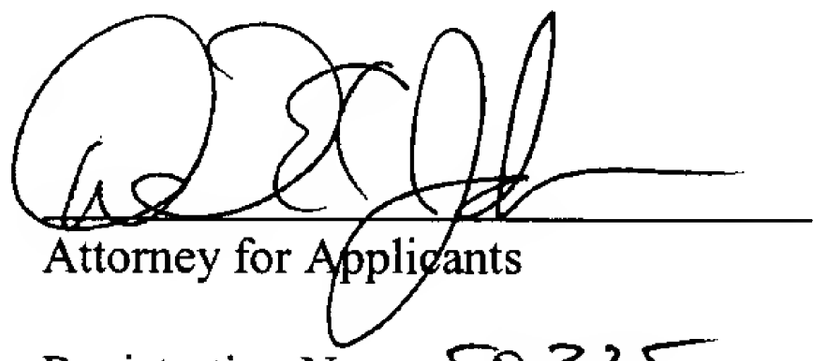
Accordingly, Ynetma, Hideo and Masahiro, either alone or in any permissible combination, are not seen to teach or to suggest every feature of the independent claims.

The other rejected claims in this application depend from the independent claims discussed above, and, therefore are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual consideration or reconsideration, as the case may be, of the patentability of each claim on its own merits is respectfully requested.

No other matters being raised, it is believed that the entire application is fully in condition for allowance, and such action is courteously solicited.

Applicants' undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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